SUPPORT FOR THE AMENDMENT

Support for the amendment to claim 1 is found on page 2, lines 26-29 of the specification. No new matter would be added to this application by entry of applicants' amendment. No new issues would be raised before the examiner has applicants have already argued on page 7 of their Amendment and Request for Reconsideration of January 21, 2009 that applicants have discovered a process which allows for reduction of hot spots and therefore extension of catalyst life while providing good catalytic activity. As this issue has been argued before the examiner, entry of applicants' amendment would not raise any new issues before the examiner. Entry of applicants' amendment and full consideration thereof at this stage of prosecution is respectfully requested.

Upon entry of applicants' amendment claims 1-20 will remain active in this application.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a process for preparing chloride gas by catalyzed oxidation of hydrogen chloride with molecular oxygen.

Applicants wish to thank examiner Johnson and supervisory patent examiner Lorengo for the helpful and courteous discussion held with their U.S. representative on June 17, 2009. At that time, applicants' U.S. representative noted that the claimed invention provides for an unexpectedly effective reduction in hot spot formation, which would allow for reaction in a single reaction zone and that such effective reduction in hot spot formation was not suggested by Iwanaga et al. in view of their essential use of at least two reaction zones. The following is intended to expand upon the discussion with the examiners.

Synthesis of chlorine gas has typically been by electrolysis of sodium chloride which also produces sodium hydroxide. While market demands for chlorine have increased, demand for sodium hydroxide has not kept pace. Accordingly, the previously used Deacon process, in which chlorine gas is produced by oxidation of hydrogen chloride, has received renewed interest. The Deacon process is reported to suffer from the formation of hot spots which can deteriorate catalyst activity such that **multiple reaction zone reactors have been developed** in which catalytic activity is matched to the temperature reaction profile. Multiple reaction zones can make processing more complex and accordingly, operation of the Deacon process under more simple conditions are sought.

The claimed invention addresses this problem by providing a method of preparing chlorine by catalytically oxidizing hydrogen chloride with molecular oxygen, wherein the reactor is equipped with **heat-exchange plates that are arranged in the longitudinal direction of the reactor** and have a spacing between them with the fixed bed catalyst packed there between. Applicants have discovered that operation of the Deacon process in a reactor in which the fixed bed catalyst is packed between spaces between heat exchange plates

arranged in the longitudinal direction allows for reduction of hot spots and therefore extension of catalyst life while providing good catalytic activity and allows for the possibility of operation in a single reaction zone. Such a process is nowhere disclosed or suggested in the cited references of record.

The rejections of claims 1, 4-9, 13, 14 and 16-20 under 35 U.S.C. 103(a) over Iwanaga et al. EP 1170250 in view of Filippi EP 1153653, of claim 2 in further view of Hoos et al. U.S. 4,922,042, of claims 3 and 12 in further view of Kuhn et al. U.S. 4,329,27, of claims 10 and 15 in further view of Smith et al. U.S. 3,807,963 and of claim 11 in further view of Stowell U.S. 3,911,843 and Grau U.S. 5,391,853 are respectfully traversed.

None of the cited references disclose or suggest operation of the Deacon process in an apparatus in which the fixed bed catalyst is disposed between spaces between heat-exchange plates which are arranged longitudinally in the reactor, nor that such a configuration would **effectively reduce hot spots** and **allow for** the operation of the process in **a single reaction zone**.

Iwanaga et al. describes a Deacon process in which is carried out in **at least two reaction zones** arranged in series, at least one of the reaction zones being provided with a heat exchange system to control the temperature. Heat exchange is provided by a jacket **outside of the tubular reactor** (column 3, lines 46-49). At least two reaction zones are used (paragraph[0016]) which allows for packing of at least two kinds of catalysts having different activities (paragraph [0017]). The use of at least two reaction zones addresses the effective suppression of excessive hot spots (column 3, lines 4-10). However, the use of at least two reaction zones is evidence of the low degree of effectiveness at reducing hot spots. Thus, while the reference pays attention to temperature regulation, there is no suggestion that by using heat exchange plates arranged in a longitudinal direction as claimed, would be

sufficient at reducing hot spots, to the extent that a plurality of reaction zones is **not necessary**.

In contrast, the claimed invention is directed to a Deacon process for producing chlorine in which the reactor has heat-exchange plates arranged in a longitudinal direction with spacing there between and a fixed-bed catalyst in gaps between the heat exchange plates. Applicants have discovered such a configuration allows for production of chlorine gas with effective suppression of hot spot formation, without the need to provide two or more separate reaction zones, which is required in the cited reference. Applicants note that the claims have been amended to recite "a process for reducing hot spot formation" in a Deacon process.

Use of Heat-Exchange Plates In Longitudinal Direction Allows For Effective Hot Spot Suppression

Iwanaga et al. requires the Deacon reaction to be conducted in at least two reaction zones (see abstract). Two reaction zones are created containing catalysts of different activities, compositions, and/or particle sizes (column 3, lines 20-24). Further the temperatures of the at least two reaction zones are independently controlled (column 3, lines 61-65). The necessity of at least two reaction zones which contain different catalyst packing and which can be operated at independent temperatures makes clear that effective hot spot suppression is not sufficient to allow for operation in a single reactor. Such a complex configuration having at least two reaction zones, using different catalysts and independently controlled temperatures would not be required if effective hot spot suppression were realized and a single reactor were deemed at all possible. Thus, by using an outside jacket as a heat-exchange means, Iwanaga et al. concluded that effective hot spot suppression was not

possible and therefore a complex configuration comprising at least two reaction zones was necessary.

In contrast, applicants have discovered by using heat-exchange plates arranged in a longitudinal direction of the reactor, that effective hot spot suppression could be realized. While page 10 of the outstanding official action notes that a single reaction zone is not a claim limitation, applicants respectfully note that by **selection** of a heat exchange system of heat-exchange plates arranged in a longitudinal direction of the reactor applicants are able to effectively reduce hot spots which allows for operation as a single reaction zones. The effective suppression of hot spots is an advantage of the claimed process which is simply not suggested by Iwanaga et al. Again, if Iwanage et al. had even suspected that hot spot formation were effectively suppressed, then a single reaction zone would have been possible. However, the complex configuration as described by Iwanaga et al clearly indicates the ineffective reduction of hot spots was expected using jacketed cooling to the extent that two reaction zones were needed. Thus, by selection of heat-exchange plates arranged longitudinally in the reactor applicants realize an advantage which is simply not suggested by the cited reference.

Filippi et al. merely describes a reactor for carrying out exothermic or endothermic reactions in which parallel plate heat exchangers are embedded in a catalyst layer. The Deacon process is not disclosed. Accordingly, there is no suggestion that such a configuration would effectively reduce hot spots and allow for oxidative production of chlorine (i.e. the Deacon process) without the need for at least two reaction zones.

None of the tertiary references cure the basic deficiencies of the combination of primary and secondary references as none of the cited tertiary references suggest that selection of a heat exchange system of heat-exchange plates arranged in a longitudinal

direction of the reactor would allow for effective reduction of hot spots and oxidative production of chlorine without the need for at least two reaction zones.

Since the cited references fails to suggest that selection of a heat exchange system of heat-exchange plates arranged in a longitudinal direction of the reactor would effectively reduce hot spots, the claimed invention is not rendered obvious and accordingly, withdrawal of the rejections under 35 U.S.C. 103(a) is respectfully requested.

Finally, applicants note the examiner interview summary form dated April 23, 2009 referencing a message left for the below signed attorney as to the status of the office action of April 20, 2009. As no interview was conducted between counsel and the examiner, no formal written reply is necessary (M.P.E.P. 713.04).

Applicants submit that this application is now in condition for allowance and early notification of such action is earnestly solicited.

Respectfully submitted,

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